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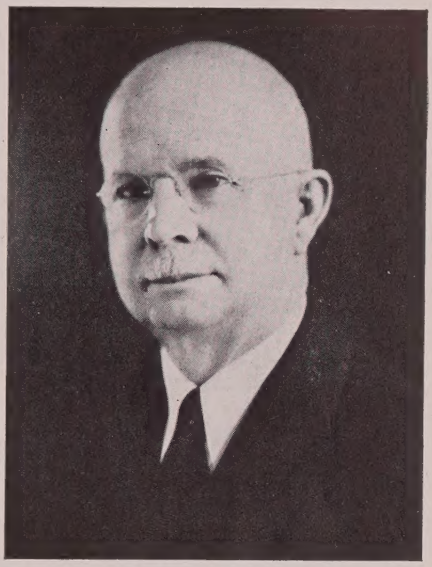
THE PRESIDENT, 1945

Perry W. Ruth, Chief, Bureau of Mosquito Control, City of Norfolk, Virginia, was elected President of the Association for the coming year. He will be inducted into office on June 30, at Norfolk by a special committee headed by the retiring President, Mr. Robert L. Vannote.

A citizen of Norfolk for forty-two years, Mr. Ruth has headed the mosquito control bureau since its inception. Coming in to mosquito work with wide experience in heavy construction and drainage, he has made the mosquito control work successful from the beginning, giving all possible protection to the citizens of Norfolk from the mosquito. Particularly during the war, his service has aided mightily in meeting the peculiar mosquito control problems arising in and about Norfolk as the result of hurried expansion of vast facilities of the armed forces.

Mr. Ruth has been active in the affairs of the Association, an officer, member of various committees, and a regular contributor to MOSQUITO NEWS. The Association is fortunate to have him for its new head. T.D.M.



MR. PERRY W. RUTH

TEN YEARS OF MOSQUITO CONTROL PROBLEMS AND PROGRESS AT NORFOLK, VIRGINIA*

PERRY W. RUTH

Chief of Bureau, Mosquito Control, Department of Public Welfare, Norfolk, Virginia

*Read before the Annual Meeting of the American Mosquito Control Association at Atlantic City, N. J., March 29, 1945.

The opportunity to be present at a gathering of so many men, distinguished in their field of endeavor, is a privilege that I appreciate very highly. Not only are the friendships made here both pleasant and valuable, but the interchange of thoughts, ideas and information which is the fundamental purpose of these meetings is undoubtedly the foundation on which the rapid advancement of our profession is laid.

The individual problems that we have to meet will differ greatly since the wide variety of climate and terrain to be found between Canada and Florida, California and New Jersey could not make it otherwise, yet our common interest binds us together as members of one family. The very nature of our work is such that it never ends; for if we relax our vigilance for a month or a week much of our success may be undone. Being forever on the alert leads to study and research and I am sure that each of us is now applying new methods, new equipment and even new materials that were quite unknown

ten years ago but have been developed through cooperative effort to the point where we can justify our contention that mosquito breeding can be definitely controlled.

I know that I, for one, am greatly impressed with the progress that has been made when I look back to the beginning of our work in Norfolk in 1933.

Our city is quite low and flat, and includes within its boundries scores of acres of tidal marshland. The salt marsh mosquito had been part of our history for so long that it was accepted as a native son; and we had been inclined to put up with its attacks as an affliction intended to restrains our justifiable pride in other civic blessings.

Then in 1933 a tropical hurricane struck us with great force. Much damage was done along miles of our water front; water was impounded in previously dry areas; natural drainage facilities were disrupted; and much marshland appeared to offer itself to mosquito breeding for the first time. The result was an increase in mosquito population that could not be ignored.

The initial task of dealing with this situation was a tremendous one; but Federal funds were available at that time for various public works, including mosquito control, and application was made by our Director of Public Welfare, Dr. H. G. Parker, for assistance in this emergency. With accurate foresight that has marked the administration of his department, he did not rest on the temporary measures that Federal funds would procure, but proposed to build upon them a permanent agency for providing protection for our people. It has been my privilege to work with him continuously in this endeavor; and the public support it has been accorded is ample proof of the soundness of his policy and the success of our efforts.

In 1933 we were primarily engaged in relieving an emergency condition and it was necessary to develop methods as we went along. It was natural to turn to New Jersey for expert advice and we were fortunate that such a man as Mr. R. E. Dorer was then available to give us the benefit of his knowledge and experience. Even so, we found that certain methods suitable to Jersey marshes required some revision before they gave the best results in Virginia tidal areas. Our forces grew until we had some 900 men equipped with hip boots and shovels; and, while in many cases they also had to be protected by gloves and head nets, in the course of time we drained off the impounded water and laced many of our tidal marshes with the ten-inch ditches that had been so effective in New Jersey.

By the time the C. W. A. went out of business, and the F. E. R. A. quit in favor of the W. P. A., we had learned quite a bit about the alphabet and even more about mosquito work. We decreased the number of our workers and increased their efficiency by proper direction and supervision until a well balanced organization was created. It was also found necessary to make radical changes in the type of ditch to insure proper tidal flow in our marshes, and in most cases the system of the drainage layout was considerably revised. Many miles of marsh ditches were installed which are still functioning satisfactorily; and in time practically all the breeding areas of the salt water species were eliminated within the city limits, although we are still annoyed occasionally by flights that come in from outside areas.

Of course this initial program was primarily directed only against the salt marsh mosquito; but while the work was in progress our organization began to make a study of the other phases of control work and the species it must combat. Thanks to Dr. Parker, city funds had been made available to carry us through the difficult periods between the death of one Federal agency and the birth of the next. Now we were ready to begin a campaign to control all the various species that can plague a city like ours; and it was largely due to his belief in the value of our work and his foresight in planning for a permanent bureau to carry it on, that the City Council provided the initial appropriation to make this possible.

Our first equipment left much to be

desired, as it had largely been discarded on other jobs. However, it worked and it continued to work until little by little it was retired to the junk pile and replaced with new. Surface drainage was in a bad condition in many acres included by the city limits and ground water was prevalent everywhere, as may be judged by the fact that we spread some 85,000 gallons of oil per season in those early days. The work of our winter maintenance men has been largely responsible for more than cutting this figure in half.

Of course this field work could reach only a small portion of the strictly domestic species such as the *Culex pipiens* and the *Aedes aegypti* which were causing much annoyance. For this purpose it was necessary to select and train a group of inspectors, and to bring our story to the public in such a way that they would cooperate. On both counts we have met with considerable success. Our inspectors have come to be recognized and welcomed by most residents as "the man with the dipper" who makes no trouble and is often a friend indeed. Through the sympathetic attitude of the Garden Clubs, Civil organizations and the Press we have been able to tell the public something of what we have done and are trying to do. The good people of Norfolk have reacted most favorably; and since they have learned that we welcome their "service requests" over the phone they have helped us to eliminate many a serious source of breeding that an inspector might never find alone.

During the last few years we have probably been no more handicapped than others in mosquito work—or those in business and industry in general, for that matter. We have all been harassed by the same shortages of men and materials and equipment; and while drainage in the Norfolk area has suffered heavy casualties from wartime construction, the exceptionally fine cooperation from the Navy Medical Department has more than compensated for damage done.

It should be of interest although no surprise that two members of our Association have been closely identified with this Navy cooperation. First is Lt. Comdr. Albert A. Weathersbee, who has been the officer in charge of mosquito work here under Rear Admiral McMullin and Captain Huff of the Medical Corps for the past year. He has done a remarkably fine job during a very difficult period, and is the type of man with whom it is a pleasure to work. We felt his loss keenly when he was transferred to duty elsewhere a short time ago and any area to which he may be assigned will be fortunate to acquire a man of his capability and experience.

It seemed most unlikely that Weathersbee's place could be adequately filled, but fortune smiled on us at just the right time. Our good friend, Donald MacCreary, was in charge of mosquito work in this Fifth Naval District in 1942, and we had lately learned that he was back in the States after a tour of foreign duty. We made inquiry, and developed the fact that it was not only quite possible but much in order for him to be returned to duty in Norfolk. So now it is Lt. Comdr. MacCreary who is continuing the fine work that has been carried on in his absence, and no one could be more pleased about it than we are. He will be under the command of Rear Admiral Luther Sheldon, Jr., our new District Medical Officer, who is a former Norfolkian and has made it evident that he has the interest of this community very much at heart.

The problem of *Anopheles quadrimaculatus* in this particular war area is in the capable hands of Mr. R. E. Dorer and the Public Health Service, but our *Aedes aegypti* breeding has caused us considerable concern. The theory formerly was generally accepted that Norfolk was situated too far north to offer a serious *aegypti* threat. However, we saw it very differently and last summer we were instrumental in bringing an official survey group to Norfolk which fully bore out our findings on the *aegypti* situation. We found outdoor breeding last year as early as June 8 in a junk yard and as late as November 24 in some of the transformer vaults of the Power Company below the downtown streets. During the late summer breeding

of this species was highly prolific in many of the older sections of the city and following the recommendations made on reports by the survey group we have reason to hope that the *"Aedes aegypti* Control" that has been established by the Public Health Service will give us help this summer in combatting what is now a very real potential danger.

Our active breeding season in Norfolk usually runs for only about six months; but there are many such special problems that carry over into the other half year, and call for special knowledge and training to find the source and eliminate the annoyance. Together with maintenance work on existing drainage systems and the extension of new ones to eliminate danger spots, our inspection and labor personnel have little opportunity for vacations. However, our technical department has found time to develop many plans for improving our field methods. A well equipped laboratory keeps an identification check on all samples which are brought in regularly; and a simple but quite adequate system of records not only keeps our story up-to-date and easy to read, but in numerous cases has operated as the detective that has helped to solve unusual problems.

As I look back to 1933, it is a satisfaction to realize how far our local organization has come in that time; and we are only one of many that have made similar progress. It is certainly true that such advancement depends largely on meetings such as these, where the cooperative effort of all of us who have the same interests can be directed to the same end, which is improved results. New ideas, new methods and new materials will soon be opened up to us as war security can be relaxed; and it is my hope that our Association will take the lead in making such discoveries available to all.

THE JEEP – A NEW VEHICLE FOR MOSQUITO CONTROL

R. E. DORER

Virginia State Health Department

In June of 1944 our organization was successful in obtaining a jeep. Our immediate concern was to rig it for larviciding. We secured a 50-gallon square tank which would fit into the space behind the front seat by removing the back seat. On top of this tank we mounted a small Bean pump with a Briggs & Stratton motor. With proper hose connections, etc., and with 200 feet of hose we had a power spray capable of reaching almost any of the inaccessible places.

When the tank and pump were mounted, this used up most of the body space, so we extended the body one and a half feet in the rear by bolting angle irons to the sides and making a wooden platform. Now the jeep can carry two or three men with spray cans and in addition is a power sprayer.

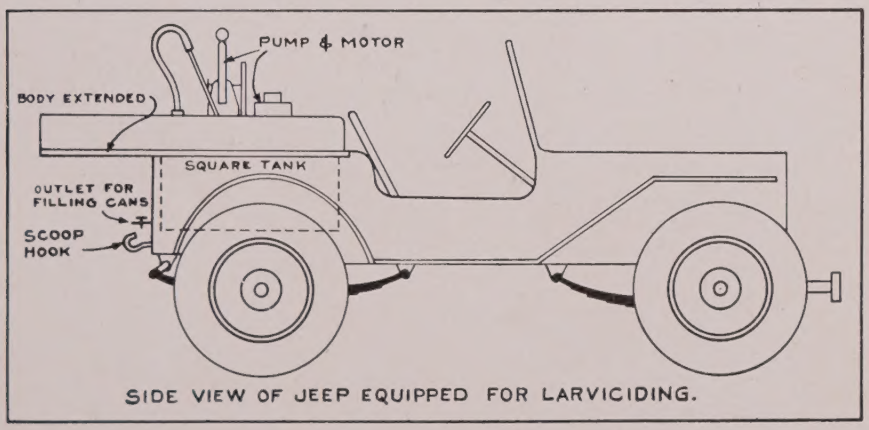
We have found that the equipment is very efficient because it can be driven through fields, underbrush, swamp lands and places inaccessible to heavier equipment. It has proven very effective in treating ditch basins, highway ditches and borrow pits.

The only apparent disadvantage seems to be that it can not carry enough oil. We plan to overcome this by making a trailer with a tank mounting which will supply enough oil for a day's work.

In addition to larviciding, we have also used the jeep to level ditch banks. We secured a one-horse scoop and attached it to the jeep. By this method, three men can do the work of a whole gang—one driving, one loading the scoop and one dumping the scoop. Thus three cubic feet of dirt were moved from a bank and leveled ever 2⅛ minutes or 1.04 cubic yards per man hour.

We have also used the jeep and scoop for making slopes on ditch banks and for cleaning culverts.

There are, no doubt, many more uses for the jeep on mosquito control. When the war is over and they can be purchased, I expect the jeep will be an important piece of equipment on the mosquito control team; and when others begin to experiment with them their use will only be limited by the operator's imagination.



SIDE VIEW OF JEEP EQUIPPED FOR LARVICIDING.

LOTUS BORER ECOLOGICALLY ANTAGONISTIC TOWARD MOSQUITOES

C. ARLIE WILSON

Malaria Control in War Areas, U. S. Public Health Service

Inside the city limits of Fort Smith, Arkansas, the surface of a pond approximately 600 square feet in area was almost completely covered with American lotus (*Nelumbo lutea* Willd.). Heavy breeding of *Anopheles* (especially *A. quadrimaculatus* Say) and *Culex* mosquitoes was found in this pond on August 5, 1943. However, it was noted that practicaly all of the lotus plants were dead. Upon closer examination, the leaves showed insect damage and the stems of the plants contained holes spaced one or two inches apart where the borers had entered. Inside the stem of each plant examined there were several borers. These borers were identified as *Pyrausta penitalis* (Grote).* Most of the lotus plants had been completely killed, and the attack had been in progress only about one week according to the entomological inspector assigned to the Fort Smith malaria mosquito control project. The pond was again visited on September 15, 1943, by the writer and the growth of lotus had been completely destroyed by the borer, thus eliminating the ideal mosquito breeding conditions formerly present.

The Fort Smith malaria control project supervisor applied oil to the pond immediately after the August 5 inspection and at regular intervals during the rest of the mosquito breeding season. Therefore, it was not possible to determine the degree of mosquito control obtained by the destruction of the lotus plants.

This insect should be of interest to entomologists and others engaged in mosquito control work, since it offers a natural method of aiding in the control of mosquito breeding in a lotus covered habitat.

*Identified by Mr. Carl Heinrich of the U. S. D. A., Bureau of Entomology and Plant Quarantine, Division of Insect Identification.

TESTS WITH DDT AS AN ANOPHELINE LARVICIDE

FREDERICK F. FERGUSON, Assistant Sanitarian (R)
WILLIAM M. UPHOLT, Assistant Sanitarian (R)
EARL H. ARNOLD, Assistant Engineer (R)
U. S. Public Health Service, Carter Memorial Laboratory, Savannah, Georgia

Preliminary work has been conducted upon the feasibility of substituting a DDT formula for fuel oil in larvicide operations. This was done by emulsifying small quantities of DDT concentrates in quantities of water so that the total application rate was the same as that of fuel oil.

Information was sought of the initial and residual larvicidal properties, gross effects on other aquatic population, and possibility of adaptation to present equipment without modification.

Surface films, emulsion and suspensions were effective larvicides at .1 pound DDT per acre. Surface films were most effective since lateral distribution was greater. Bottom applications did not perform as well as did the other three types of larvicides.

Observation indicated that the distribution of DDT and thus its toxic effect was limited to the distribution of the solvent. Treatment of a portion of a pond did not exercise control over the remainder.

No marked residual properties have been observed at concentrations of DDT up to 0.5 pounds per acre. In the laboratory the bottom mud complex from natural ponds or swamps renders DDT non-effective after two to three days. Indications are that living organisms are not responsible for making the DDT unavailable.

DDT in the concentrations and combinations, normally applied as a larvicide (i.e., .1 pound per acre), seemed to have little effect on the plankton organisms, and no damage to fish life was observed.

A GUINEA PIG HOLDER

FRANKLIN C. WRAY

Laboratory Technician, Des Plaines Valley (Illinois) Mosquito Abatement District

A new style of device for holding a guinea pig motionless while mosquitoes obtain a blood meal has been constructed for use in our laboratory. The drawing (Fig. 1) and the photographs (Figs. 2 and 3) illustrate the construction and use of this holder.

The holder is made of galvanized iron with over-all dimensions of 8 inches by 4 inches by 2½ inches. Three inches at one end has a top, providing a place for the guinea pig to hide his head while acting as a blood donor. A wad of cotton batting may be stuffed in this end to adjust the various sized animals in the holder so that their bodies will be exposed to the mosquitoes. The remainder of each side of

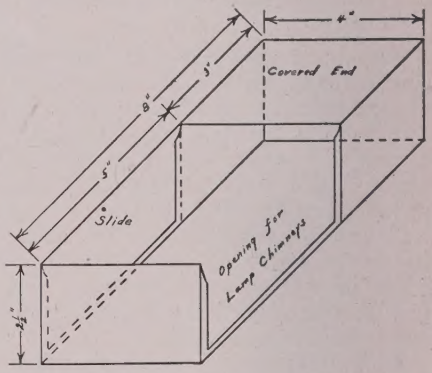


Fig. 1. Design for construction of guinea pig holder. The slide is removable, and may be inserted on left or right.

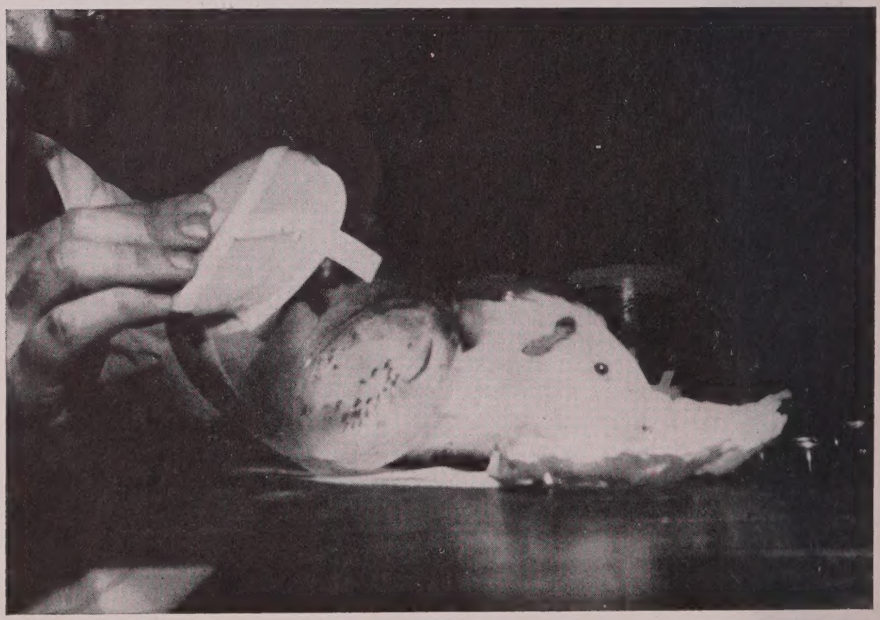


Fig. 2. Feeding adult mosquitoes a blood meal is a difficult and time wasting procedure without the guinea pig holder.

Fig. 3. Feeding adult mosquitoes a blood meal with the aid of the guinea pig holder saves time, and multiplies the productive capacity of the operator.

the box has been cut away, providing a space just large enough for a lamp chimney full of mosquitoes to rest on the clipped side or back of the animal. Either the right or left side of the animal can be exposed by shifting the sliding section to the opposite side of the box. The ¼-inch edge at the bottom of the opening serves to hold the lower edge of the chimney in place. A metal collar fits over the top of the chimney and by means of a spring holds the chimney in constant contact with the animal's side or back, allowing the mosquitoes an uninterrupted opportunity to obtain their blood meals by biting the animal through the mosquito netting that is stretched across both ends of the chimney.

The use of this device has caused the guinea pig to remain motionless and quiet for periods of as much as two hours while a series of chimneys were placed in contact with his body. Previously it had been necessary to hold him by hand, an unsatisfactory method, inasmuch as he was constantly struggling to escape, thereby disturbing the feeding mosquitoes and lengthening the operation as well as taking up the time of one person who with this device can continue with other duties.

FIELD TESTS OF DDT* IN SOLUTION IN CRANK CASE OIL AS A LARVICIDE AGAINST ANOPHELINE LARVAE

M. A. BARBER
Volunteer Worker with the U. S. Public Health Service

These tests were done during the period June to October, 1943, inclusive, in western Tennessee and eastern Arkansas. The species of anophelines tested were *A. punctipennis* and *A. quadrimaculatus.* Nearly 100 breeding places of a great variety of type were tested.

By crank case oil is meant the waste lubricating oil collected in the crank cases of internal combustion engines. We have used successfully solutions of 2% to 10% but have recently been using 5%; the last being very effective as a larvicide, more economical of DDT and readily got into solution at room temperature. Crank case oil was chosen in preference to other petroleum oils because almost universally available and very inexpensive. Further, DDT crank case oil spreads remarkably well over water; we have dispensed with all kinds of sprayers, and have not found it necessary to filter or otherwise prepare the oil for use. Waste is avoided since in many breeding places of larvae it is applied at only one or two points. It is very floatable, can be used in almost any kind of weather, and when used in ordinary larvicidal doses has done no harm to the human operators, domestic animals, fish or rice.

As methods of dispersal we have successfully used an oil can or a simple oil gun. Further, a mixture in the proportion of 1 cc. of DDT crank case oil in 10 cc. of sawdust has proved very effective for scattering the larvicide. Lacking sawdust, dry sand or dirt has proved very effective. Cork dust is useful when great floatability is necessary.

Area of Spread and Dosage. Spread of DDT crank case oil is much farther than in the mere film. In still water, we have found a dose of 2 cc. applied at one point effective over an area of 2x17 yards; a dose of 10 cc., similarly applied, over an area of 5x47 yards. In stream, a dose of 150 cc. was effective for about 400 yards, a dose of 360 cc. for about ⅜ mile in a larger stream. In general, in still waters we have found effective a dosage of 50 cc. of DDT crank case oil per 1,000 square meters. Much less has been effective in waters treated soon after a rain or otherwise free from scum or other debris. For very scummy waters a larger dosage is recommended. Vertical or overhanging vegetations offers no significant obstruction. It cannot be too strongly emphasized that heavy doses such as those used commonly for larvicidal oils are wasteful, add unnecessarily to transportation, and may destroy a part of the fish. The essential advantages of the DDT crank case oil larvicide are its spreading power and its extreme toxicity to anopheline larvae. For culicine larvae like *Psorophora* we have found necessary somewhat large dosage than for anophelines.

Permanence of a single treatment has been hard to measure because of lack of suitable untreated controls. In any case, the interval between necessary doses is much lengthened, and in some ponds has apparently extended to several weeks. Application of this larvicide is so easy that permanence is less necessary.

We are now experimenting with devices which may greatly lessen the necessity of frequent dosage and may make possible the simple treatment of large areas. Among these is the utilization of the gradual freeing of the oil by slowly dissolving salts, by plaster of Paris, or by wicks.

*DDT was first found to be an effective mosquito larvicide by E. F. Knipling, C. C. Deonier and others at Orlando, Fla., and samples were obtained from them under a contract recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and the Bureau of Entomology and Plant Quarantine.

NEWS OF THE ASSOCIATION

The American Mosquito Control Association is now a year old. Founded in March of 1944, to succeed the Eastern Association of Mosquito Control Workers which organization had grown steadily from its origin in 1935 to finally attain national scope, the American Association has continued to make steady progress, extending its membership and improving the journal, MOSQUITO NEWS.

To conduct the business of the Association, frequent meetings of the Executive Committee and of the Publications Committee were necessary during 1944 and the early part of 1945, and several matters of outstanding importance to the future of the Association have been under frequent consideration, including the development of a standard form for MOSQUITO NEWS, and the writing of a new and more suitable constitution and by-laws.

Mosquito News

Following a careful study of the needs to be met by the journal, and a survey of existing periodicals issued by other successful organizations, a standard format and style for MOSQUITO NEWS was adopted, the new series beginning with Volume 5, Number 1, March 1945.

Constitution and By-Laws

The suitability of the original constitution was questioned at the organization meeting in 1944, and the Constitution Committee, composed of Dr. E. N. Cory, Mr. R. E. Dorer, and Mr. R. L. Vannote, was directed to review it. After study of the particular needs of the association as revealed during the first year of its existence, the Constitution Committee prepared an entirely new document, which has been approved by the Executivce Committee, and subsequently adopted by the general membership. The Constitution and By-Laws are appended to this statement. Not only do these documents provide for the conducting of the ordinary business of the Association, but it is particularly to be noted that a new section creating an Advisory Council will allow the affiliation of sectional mosquito control and related organizations with the American Association, and will also provide for cooperation with organizations in other fields in the solution of problems of common interest.

1945 Annual Meeting

Because the action of the Office of Defense Transportation prevented the holding of a regular annual meeting, by restricting attendance at public meetings, the Executive Committee directed that a paper-reading session be held and that the usual business of the annual meeting be conducted by mail, to assure full representation of the entire membership.

On the afternoon of March 29, an inspection of a circulatory system of salt marsh drainage was held near Atlantic City, under the guidance of Mr. Fred A. Reiley, Superintendent of the Atlantic County Mosquito Extermination Commission. In the evening of the same day, at the Hotel Claridge, Atlantic City, N. J. several papers were read, as follows:

> Mosquito Control at Norfolk, Va., by Mr. Perry W. Ruth, Chief of Bureau of Mosquito Control, City of Norfolk.
> The Jeep—A New Vehicle for Mosquito Control, by Mr. Roland Dorer, Director Malaria Control, Norfolk, Va.
> Paris Green and its Use in Malaria Control, by Major Herman Fellton, Malaria Control in War Areas, USPHS, New York, N. Y.

At the meeting, President Robert L. Vannote named a Nominations' Committee to prepare a list of candidates for office for 1945. This committee consisted of the following: Mr. Lester W. Smith, Mr. Roland E. Dorer, and Mr. C. T. Williamson. The names of the nominees were included on the ballot sent the membership on June 1, for return by June 16, when they were counted by a special Elections Committee, which included President Robert L. Vannote, Mr. Lester W. Smith, Major Herman

Fellton, Dr. Elton J. Hansens acting for Dr. Bailey B. Pepper, and the secretary, Thomas D. Mulhern. Thirty-seven valid ballots were received, and a tabulation of the votes follows:

Office	*Candidates and Votes Received*	
President:		
	Mr. Perry W. Ruth	35
First Vice-President:		
	Dr. Robert Glasgow	34
	Dr. Robert Matheson	1
Second Vice-President		
	Mr. H. H. Stage	36
Secretary-Treasurer:		
	Mr. Thomas D. Mulhern	34
Editor Mosquito News:		
	Dr. Robert Glasgow	35
Business Manager:		
	Mr. C. T. Williamson	35
	Mr. T. D. Mulhern	1
Executive Committee:		
	Dr. L. A. Stearns	37
	Major Herman Fellton	36
Publications Committee:		
	Dr. Robert Matheson	36
	Mr. R. E. Dorer	1
	Major Herman Fellton	34
	Dr. W. B. Herms	1

The constitution was adopted by a vote of 33 favorable votes, to 2 opposed. Two ballots carried no vote for or against the constitution.

By direction of President Robert L. Vannote, an inaugural ceremony has been arranged and will be held at Norfolk, Va. on July 1, at which time President-elect Perry W. Ruth will take office.

T. D. MULHERN.

CONSTITUTION AND BY-LAWS

REVISED CONSTITUTION AMERICAN MOSQUITO CONTROL ASSOCIATION

(This document approved by the Executive Committee at a meeting on May 22, 1945, and ordered submitted to the membership, for a vote to adopt or reject it. Adopted June 16, 1945.)

ARTICLE I

Name and Objectives

Section 1. This Association shall be known as the American Mosquito Control Association. Formerly known as the Eastern Association of Mosquito Control Workers, this Association expanded in membership so as to be no longer regional in scope, and a resolution was adopted at the Annual Meeting on March 16, 1944 to effect the adoption of a more appropriate name, and the transfer of all assets and liabilities together with the responsibility for the publishing of MOSQUITO NEWS to the Association under the new name.

Section 2. This Association shall be a non-profit, educational organization.

Section 3. Its objectives shall be: (1) To promote the efficiency of mosquito control through the encouragement of research, development of procedures and the interchange of information; (2) To publish MOSQUITO NEWS as the official journal of the Association for the dissemination of knowledge concerning mosquito control and related problems, and; (3) To encourage field trips and meetings of the membership.

ARTICLE II

Membership

Section 1. Membership in this Association shall consist of persons engaged or interested in mosquito control and related work.

Section 2. The following classes of membership shall be recognized: (1) Active or voting membership; (2) Association or non-voting membership, and; (3) Honorary membership.

Section 3. Nomination of candidates for membership as Active or Associate Members shall be made by two (2) members to the Secretary-Treasurer, for consideration and election by the Executive Committee or by the Association in Annual Meeting.

Section 4. Honorary Membership may be conferred by three fourths vote of all Active Members at an Annual Meeting upon recommendation of the Executive Committee.

ARTICLE III

Officers

Section 1. The officers shall consist of a President, a First Vice-President, a Second Vice-President, who shall be elected annually, and a Secretary-Treasurer who shall be elected for a term of 3 years.

Section 2. All officers shall be elected at the Annual Meeting, by the majority of those Active Members present and voting. Absentee members may vote by proxy. The election may be conducted by mail when in the judgment of the Executive Committee such voting is necessary or desirable.

Section 3. All officers shall continue to hold office until successors are regularly elected.

ARTICLE IV

Meetings, Quorum and Voting

Section 1. There shall be one Annual Meeting, the time and place of which shall be determined by the Executive Committee; and such other meetings as may be desirable. Any twenty-five (25) Active Members may request a meeting and such

a meeting shall be arranged by the Executive Committee.

Section 2. Twenty percent of the Active Members shall constitute a quorum for the transaction of business of the Association.

Section 3. Voting and the holding of office shall be limited to Active Members.

ARTICLE V

Executive Committee

Section 1. The President, the immediate Past President, the First Vice-President, the Second Vice-President, the Secretary-Treasurer, the Editor, the Business Manager of MOSQUITO NEWS, and two members elected at the Annual Meeting shall constitute the Executive Committee. Five members of the Executive Committee shall constitute a quorum.

ARTICLE VI

Funds

Section 1. The Funds of the Association shall be collected, entered, disbursed and accounted for by the Secretary-Treasurer as the By-Laws prescribe and in such a manner that the financial status of each activity can be easily determined.

Section 2. Dues to the Association shall be assessed to each member other than Honorary as prescribed in the By-Laws.

ARTICLE VII

Publication

Section 1. MOSQUITO NEWS shall be the official journal of this Association. There shall be elected annually an Editor, and every three years a Business Manager; who together with the Secretary-Treasurer of the Association and two (2) Active Members, elected at large annually, shall constitute the Publication Committee, which shall be the policy-forming committee for MOSQUITO NEWS. All members of the Publication Committee will remain in office until successors are regularly elected.

ARTICLE VIII

Amendments

Section 1. Proposed amendments shall be submitted to the Secretary-Treasurer for consideration by the Executive Committee, which may report their recommendations at the next Annual Meeting, or may refer the proposed amendments to a special committee to be appointed by the President, for further consideration and the formulation of recommendations to be presented at the next Annual Meeting. The Secretary-Treasurer shall send to each Active Member a copy of the proposed amendments and recommendations together with a ballot at least thirty (30) days before the next Annual Meeting.

Section 2. A two-thirds affirmative vote shall be required for adoption.

ARTICLE IX

Advisory Council

Section 1. The Association shall collaborate with other organizations and agencies in furthering matters of mutual concern, and in efforts to find mutually acceptable solutions for problems arising from any divergence of interest.

Section 2. As a medium of such collaboration, there shall be an Advisory Council which, in addition to the last Past President, the President, the First Vice-President and the Secretary-Treasurer of the Association, shall consist of one member chosen by each organization or agency that may be invited by the Executive Committee to participate.

Section 3. In the event special problems or matters of mutual interest arise which appear to be of sufficient concern to an organization not regularly represented on the Advisory Council, such organization or agency may be invited to select a representative to sit with the Advisory Council through any special consideration of such special problem or matter of mutual interest.

Section 4. On matters of common interest or problems of mutual concern to mosquito control practices, the Advisory Council may, on request of the Executive Committee, canvass the situation and make an appropriate report or recommendation to the Executive Committee of the Association.

Section 5. The immediate Past President of the Association shall be the permanent Chairman of the Advisory Council and the Secretary-Treasurer of the Association shall be the permanent Secretary of the Advisory Council.

Section 6. Meetings of the Advisory Council for the conduct of business shall be called by the Chairman at such time and place as shall be most convenient to the majority of the members of the Advisory Council.

ARTICLE X

Committees

Section 1. Committees of the Association shall be appointed by the President unless otherwise ordered by a vote of the Association. The terms of all Committees except Standing Committees shall expire at the end of the next Annual Meeting unless otherwise specified by vote of the Association.

Section 2. There shall be the following Standing Committees consisting of at least three members appointed by the President, (the President and Secretary-Treasurer being *ex-officio* additional members of such Committees): Membership Nominations, Legislative, Finance, Audit, and such other Standing Committees as may be necessary for the conduct of the business of the Association. Membership to all Committees shall be annual.

BY-LAWS
AMERICAN MOSQUITO CONTROL ASSOCIATION

ARTICLE I

The Manual of Parliamentary Rules as generally adopted in this country shall be the rules of this Association, except where otherwise provided for.

ARTICLE II

Officers and Their Duties

Section 1. It shall be the duty of the President to preside at all meetings of the Association or the Executive Committee, and to prepare an address to be delivered at the Annual Meeting over which he presides. He shall announce his appointment of committees at the first session of the Annual Meeting and shall have and exercise such powers as are reasonably necessary to carry out his official duties, including, with the approval of the Executive Committee, the filling of vacancies in the officers and elected committees; such appointees to serve until the next Annual Meeting.

Section 2. In the absence of the President, the First Vice-President, or in his absence, the Second Vice-President, shall assume the duties of President.

Section 3. It shall be the duty of the Secretary-Treasurer to make the necessary arrangements for all meetings of the Association, to keep a record of proceedings and to attend to general correspondence. He shall submit bills for dues to the membership, collect all moneys due, pay all bills incurred by the Association after approval by the Executive Committee and on signature of the President and the Committee Chairman or other officer responsible for the debt, submit a report at each Annual Meeting and Executive Committee Meeting, and perform such other duties as may be delegated to him. He shall furnish a suitable surety bond and his accounts shall be audited annually by a Committee appointed by the President, which audit shall be submitted at the Annual Meeting.

Section 4. The Executive Committee shall transact the business of the Association between Annual Meetings. It shall act as trustee of the Association property; it shall make recommendations on policies to the Association and shall render a report at the Annual Meeting. The Executive Committee shall prepare programs for all meetings of the Association and may receive and approve or reject the reports of the Standing Committees. It shall act for and in behalf of the Association in any administrative or legislative capacity between meetings and report to the Association the result of such action at the next meeting. The Executive Committee shall have a meeting at the close of the Annual Meeting and shall schedule and arrange special meetings and field trips for the benefit of the Association.

Section 5. All elected officers of the Association shall assume office after the close of the Annual Meeting and shall continue to serve for one (1) year or until their successors are elected.

Section 6. The Fiscal Year of the Association shall close on December 31st and all financial reports shall be closed as of that date.

ARTICLE III

Dues

Section 1. The annual dues of Active Members shall be $4.00 payable in advance, and shall include subscription to MOSQUITO NEWS.

Section 2. The annual dues of Associate or Non-voting Members shall be $2.50, payable in advance, and shall include subscription to MOSQUITO NEWS.

Section 3. No annual dues shall be payable by Honorary Members who shall receive a complimentary subscription to MOSQUITO NEWS.

ARTICLE IV

Meetings

Section 1. Special or Annual Meetings shall be called as provided in the Constitution. Notice of such meetings shall be given by the Secretary-Treasurer by mailing to all members a formal notification of the time and place of the meeting at least two weeks before the date fixed in the notice. In the case of special meetings the notice shall state the reason for the meeting and shall specify the business to be transacted.

ARTICLE V

Amendments

Section 1. Changes in these By-Laws may be made by a two-thirds vote of the membership at any meeting; provided, that notice in writing of the proposed amendment shall have been sent to every active member at least one month before the date of the meeting at which it will be considered.

NEWS AND NOTES

MOSQUITO NEWS FROM CALIFORNIA.—The following six interesting and significant notes are extracts from a letter from H. F. Gray, which came too late for the March number of MOSQUITO NEWS.—Editor.

1. CALIFORNIA PROPOSES REVISION OF LAWS TO EXPEDITE THE ORGANIZATION AND EXTENSION OF MOSQUITO ABATEMENT DISTRICTS. Several bills relating to mosquito control have been introduced into the 1945 Legislature. Three of them have to do with simplified procedures by which organization of, or annexation to, mosquito abatement districts can be expedited.

H. F. Gray.

2. CALIFORNIA PROPOSES TO SPEND $1,000,000 FOR INTENSIVE CONTROL OF MOSQUITOES TRANSMITTING EPIDEMIC VIRUS ENCEPHALITIS. Senate Bill No. 611 proposes an appropriation of $1,000,000 for the 1945-47 biennium, to be expended by the State Department of Public Health for intensification of mosquito control, principally against mosquito-transmitted epidemic virus encephalitis. This disease complex has since 1935 become far more important than malaria as a public health problem in California. The following distribution of expenditures under this fund is proposed:

	First Year	*Second Year*
Training Program	$12,000	.....
Administration	50,000	$50,000
Equipment for Mobile Units	8,000	1,600
Field Personnel	15,000	15,000
Materials and Supplies	2,000	2,000
Transportation	2,000	2,000
Travel Expense	8,000	8,000
Contingencies	3,000	3,000
Subventions to Local Agencies	400,000	418,400
Totals	$500,000	$500,000

H. F. Gray.

3. CONCERN ON PACIFIC COAST OVER POSSIBLE INTRODUCTION OF HIGHLY FATAL JAPANESE B. ENCEPHALITIS. Appreciable concern is being felt over the possible introduction into the Pacific Coast area of the virus of Japanese B. encephalitis, a highly fatal (60 per cent case-fatality rate) disease which has appeared in epidemic form in Japan and elsewhere. The imminence of military operations in Japan, Formosa and China brings this problem sharply into focus in 1945.

H. F. Gray.

4. HOOPER FOUNDATION TO TEST RESIDUAL DDT SPRAYING OF CHICKEN HOUSES, BARNS AND OTHER ANIMAL SHELTERS AS EXPERIMENTAL PROJECT FOR CONTROL OF VIRUS ENCEPHALITIS. Several comparative and controlled experimental areas for the use of DDT as a residue spray on chicken houses, barns and other animal shelters are being set up by the Hooper Foundation for Medical Research, as a control project for virus encephalitis. The principal experiment is to start in April in Kern County, with a supplemental experiment later near Marysville in Yuba County.

H. F. Gray.

5. MOSQUITO ABATEMENT DISTRICTS IN CALIFORNIA. A new mosquito abatement district was organized in the Lodi area in San Joaquin County in January, 1945. Procedures for the formation of a large district in Yuba and Sutter Counties are well advanced. A large annexation to the Dr. Morris district in Kern County was affected in January. There are now 27 organized mosquito abatement districts in California (of which one is not operating), plus two pest abatement districts organized for mosquito abatement.

H. F. Gray.

6. ADVANCED SEASON FAVORED EARLY FIRST BROOD OF SALT MARSH MOSQUITOES IN SAN FRANCISCO BAY AREA. Due to a relatively mild and rainless last half of February, the first brood of salt marsh mosquitoes is well advanced this year. Pupae were appearing at the end of the month, and flights from uncontrolled marshes about San Francisco Bay are expected about mid-March. This early brood is principally *Aedes aquamiger*.

H. F. Gray.

A PUBLIC HEALTH COURSE ON CONTROL OF MOSQUITOES, which was recently completed, was given jointly by Rutgers University and the New Jersey State Department of Health, with classes held each Saturday afternoon from 2:00 to 5:00 p.m., February 24th through April 28th, 1945.

This course was designed to supplement the course in Diagnosis of Malaria and Tropical Diseases given in 1944, and to provide public health personnel, mosquito control officials and their employees, teachers, officers of institution, and governmental agencies responsible for the suppression of mosquitoes with up-to-date knowledge of facts and approved methods relating to the effective control of both disease carrying and pest mosquitoes.

The enrollment fee was $5.00, payable to the University.

The course included:

Classification of Mosquitoes, 10 hours (2 lectures, 4 laboratory periods)—J. B. Schmitt, Ph.D., Research Associate, Department of Entomology.

Mosquito Biology, including biological control, 5 hours (3 lectures, 1 laboratory period)—E. J. Hansens, Ph.D., Assistant Entomologist.

Chemical Control, 6 hours (2 lectures, 2 laboratory periods)—J. S. Ginsburg, Ph.D., Assistant Professor of Entomology.

Mechanical (Engineering) Control, 6 hours (2

lectures, 2 laboratory periods)—T. D. Mulhern, Associate in Mosquito Control.

MEMBER INTEREST.—It was indeed pleasing to be allowed the privilege of serving as one of the sponsors signing the membership application of Mr. Harold Hannaway, whose interesting letter relating to his collection of mosquitoes in Massachusetts follows. Though he is not professionally engaged in mosquito work, Mr. Hannaway evidently has a very great interest in our common enemy. We welcome him to membership, and hope he may be able to attend future meetings of the Association.

T.D.M.

"April 22, 1945.
"Boston, Mass.

"MR. THOMAS MULHERN, *Secretary*.

"Dear Sir:

"I have filled out the membership blank and hope it meets the approval of the committee.

"MOSQUITO NEWS is just what I was looking for, and in reading the December issue I found out about the new book by Dr. Robert Mathesson which I have since bought.

"A number of towns around Boston are doing mosquito control work this summer. As I am working in a defense plant I was unable to work with this group, but I have offered my service gratis in determining the specimens they may collect. The information gained by these towns' collections will help me in my general knowledge of the mosquitoes of Massachusetts.

"On April 19th I collected one anopheline larva, 2nd instar, in Belmont. This is the earliest date for any anopheline larva in my seven years of collecting and to check its occurrence I called Mr. R. W. Wales, entomologist for the State Reclamation Board of Massachusetts, to learn from him that he has found anopheline larvae in April, but it is more generally taken in late July, August, and September. Our early warm spring days must have hatched it out.

"This unusual weather has changed the aedes cycle in early spring woodland pools. In pools for which I have records for the past four years, where *Aedes canadensis* was the early species, I have this season found instead *Aedes cinereus* and *Aedes excrucians*. The last species I had listed as occurring in grassy pools in meadows, but, lo and behold, it appears in leaf filled woodland pools.

"I think it is the unknown and strange places, plus the fact that you never can tell what larva may be in your dipper, that makes mosquito hunting a fascinating science.

"I received Dr. Headlee's new book, 'The Mosquitoes of New Jersey and Their Control,' yesterday.

"Dr. Thomas Headlee's observation on the *Mansonia perturbans* larva is very valuable to me. I have not as yet found this specimen, though I have pulled and dug up many aquatic plants. Yet I have been driven out of certain sections of open meadows by the adults.

"I am looking forward to the next issue of MOSQUITO NEWS.

"Sincerely,

(Signed) "HAROLD HANNAWAY."

NEW G.I. HAND DUSTER. A G.I. hand duster which sprays ten pounds of Paris Green over mosquito-infested areas in 15 minutes wasn't good enough for Technical Sergeant Claude R. Strickland, entomology technician with the 29th Malaria Control Detachment near Dakar, Africa.

So he got to work and developed a mechanical duster which, by the use of a fan, can put out 150 pounds of Paris Green in the same time—fifteen times as much as the hand duster.

The sergeant turned his design over to the Army and was awarded the Legion of Merit "for exceptionally meritorious conduct in performance of outstanding service."

Sergeant Strickland told his story while at the Fort McPherson Separation Center awaiting discharge because of his age—42. He has been in the Army two and a half years; two years of that time were spent overseas in eastern, western and northern sections of Africa. The sergeant perfected his mechancial duster while near Dakar.

Before he entered service, Sergeant Strickland was sanitary technician for Pinella County, Fla. Upon return to civilian life, he plans to manufacture insect control appliances of his own design.

The sergeant's home is at 1703 40th St., St. Petersburg.

From Public Relations Office,
Fort McPherson, Georgia

T.D.M.

THE THIRTY-SECOND ANNUAL MEETING OF THE NEW JERSEY MOSQUITO EXTERMINATION ASSOCIATION.

The 1945 Annual Meeting of the New Jersey Mosquito Extermination Association was held at the Hotel Claridge, Atlantic City, N. J., on March 28, 29 and 30, 1945. The program included many interesting papers, with great emphasis being placed upon the new problems in the control of mosquito-borne diseases which are facing mosquito workers in this country, due to the increased likelihood of the introduction of these diseases as men return from tropic war areas where they are prevalent. Papers relating to DDT were likewise heard with a great deal of interest, and promoted discussion of this much heralded insecticide. The demand for the four papers particularly referring to this subject was so great that they were preprinted, in an edition of 500 copies, the supply of which was exhausted in less than two months. The complete papers will be printed, with the discussion, in the "Proceedings" of the meeting, to be available during the summer of 1945.

The program was as follows:

First Session

Wednesday, March 28 - 2:00 to 5:00 P.M.

OPENING REMARKS OF THE PRESIDENT. Mr. William H. Dillistin, President, New Jersey Mosquito Extermination Association, Federal Reserve Bank, New York, N. Y.

A REVIEW OF MOSQUITO WORK IN A WORLD AT WAR IN 1944. By Dr. F. C. Bishopp and Mr. H. H. Stage, Bur. of Entomology, U.S.D.A., Washington, D. C.

ENTOMOLOGICAL EVALUATIONS OF CONTROL WORK IN THE MALARIA CONTROL IN WAR AREAS PROGRAM. By G. H. Bradley, Sr., Entomologist (R), U. S. Public Health Service, Atlanta, Georgia.

THE DISEASE MALARIA, FROM THE POINT OF VIEW OF THE PRACTICING PHYSICIAN. By Dr. Howard B. Shookhoff, Epidemiologist in Tropical Diseases, New York City Department of Health, New York, N. Y.

PROGRESS IN THE DEVELOPMENT OF DDT AS A MOSQUITO LARVICIDE. By Dr. J. M. Ginsburg, Biochemist in Entomology, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

EXPERIMENTS USING DDT AND OTHER MATERIALS FOR THE CONTROL OF RESTING ADULTS OF *Anopheles quadrimaculatus* MOSQUITOES. By Dr. E. J. HANSENS, Research Associate in Agriculture, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

LABORATORY EVALUATION OF CHEMICALS FOR RENDERING FABRICS REPELLENT TO MOSQUITOES. By Dr. Philip Granett and Mr. Harry Haynes, Rutgers University, New Brunswick, N. J.

ANTI-MOSQUITO WORK IN AUSTRALIA AND NEW GUINEA (KODACHROME SLIDES). By Dr. F. C. Bishopp, Bureau of Entomology, U.S.D.A., Washington, D. C.

Second Session

Wednesday, March 28 - 8:00 to 10:00 P.M.

THE MOSQUITO WORK IN PASSAIC COUNTY, N. J. By Captain William Dunney, Commissioner, Passaic County Mosquito Extermination Commission, Paterson, N. J.

MOSQUITO WORK ON A WARTIME BASIS: SPECIAL PROBLEMS AND THE MANNER IN WHICH THEY ARE BEING MET, IN:

(a) CALIFORNIA: By Harold F. Gray, Engineer, Alameda County Mosquito Abatement District, Oakland, Calif.

(b) VIRGINIA: Mr. Roland E. Dorer, Assistant State Director Malaria Control, Norfolk, Va.

(c) THE CITY OF NORFOLK, VA.: Mr. Perry W. Ruth, Chief of Bureau of Mosquito Control, City of Norfolk, Va.

(d) PENNSYLVANIA: Major Russell W. Gies, USPHS, Philadelphia Department of Health, Philadelphia, Pa.

(e) THE CITY OF PHILADELPHIA, PA.: Dr. Rufus S. Reeves, Director, Department of Public Health, Philadelphia, Pa.

(f) NASSAU COUNTY, LONG ISLAND: Mr. Ray H. Sammis, Superintendent, Nassau County Mosquito Extermination Commission, Rockville Center, N. Y.

(g) MASSACHUSETTS: Mr. Edward Wright, Chairman, State Reclamation Board, Boston, Mass.

THE REARING OF *Anopheles quadrimaculatus* MOSQUITOES FOR LABORATORY USE. By Dr. Ralph E. Heal and Mrs. Margaret Pergrin, Merck & Co., Rahway, N. J.

MALARIA IN NEW JERSEY IN 1944. By Mr. William H. MacDonald, Chief, Bureau of Local Health Administration, New Jersey State Department of Health, Trenton, N. J.

MOTION PICTURES, SLIDES, ETC.

Third Session

Thursday, March 29 - 9:30 A.M. to 12:00 M.

THE ARMY'S PROGRAM TO MINIMIZE THE DANGER OF INTRODUCTION OF MOSQUITO BORNE DISEASES BY RETURNING PERSONNEL. By O. R. McCoy, Lt. Col. M.C., Director, Tropical Disease Control Division, Office of the Surgeon General, Washington, D. C.

SPECIALIZED MILITARY EQUIPMENT AND POSSIBLE USES FOR IT IN MOSQUITO CONTROL BY CIVILIAN AGENCIES AFTER THE WAR. By Lt. Col. J. J. Gilbert, Sn.C., and Captain W. D. Reed, C.E., Washington, D. C.

ANTI-MOSQUITO WORK IN CANADA IN 1944. By C. R. Twinn, Associate Entomologist, Department of Agriculture, Ottawa, Canada.

MOSQUITO RESEARCH IN THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE OF THE AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE, 1944. By Mr. H. H. Stage, Acting in Charge, Division of Insects Affecting Man and Animals, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.

MOSQUITO TRANSMITTERS OF DISEASE. By Dr. Robert M. Stabler, Professor of Parisitology, University of Pennsylvania, Philadelphia, Pa.

OPERATIONAL PLANNING FOR THE MALARIA CONTROL IN WAR AREAS DDT RESIDUAL HOUSE SPRAYING PROGRAM. By John M. Henderson, Sr., Sanitary Engineer (R), U.S.P.H.S., Atlanta, Ga.

TRAINING AND EDUCATIONAL SERVICES ON THE MALARIAL CONTROL IN WAR AREAS PROGRAM. By W. S. Boyd, Surgeon (R), U.S.P.H.S., Atanta, Ga.

Fourth Session

Thursday, March 29 - 2:00 to 6:00 P.M.

ANTI-MOSQUITO WORK IN THE OTHER AMERICAN REPUBLICS. Dr. Clark H. Yeager, Chief, Medical Section, The Institute of Inter-American Affairs, Washington, D. C.

A SUMMARY OF MOSQUITO WORK IN NEW JERSEY IN 1944. By Thomas D. Mulhern, Administrative Assistant, Grade I, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

NEED FOR MOSQUITO CONTROL:

IN CUMBERLAND COUNTY: By Dr. Joseph Lamb, President, Cumberland County Mosquito Extermination Commission, Bridgeton, N. J.

IN GLOUCESTER COUNTY: By Mr. Hugh Mehorter, Member, Goucester County Board of Chosen Freeholders, Woodbury, N. J.

THE RELATION OF MOSQUITOES TO NEW JERSEY AGRICULTURE. By Dr. Bailey B. Pepper, Acting Head, Department of Entomology, Nwe Jersey Agricultural Experiment Station, New Brunswick, N. J.

THE MOSQUITO CONTROL PROGRAM IN CAMDEN COUNTY. By Walter G. Evans, Superintendent of Mosquito Control in Camden County, Camden, N. J.

THE MERCER COUNTY MOSQUITO EXTERMINATION COMMISSION. By Mrs. Charles Maddock, Member, Mercer County Mosquito Extermination Commission, Trenton, N. J.

THE INTEREST OF THE NEW JERSEY FEDERATION OF WOMEN'S CLUBS IN WARTIME MOSQUITO CONTROL. By Mrs. John A. Hilton, Chairman Mosquito Control, New Jersey State Federation of Women's Clubs, Wildwood, N. J.

THE OUTLOOK FOR NEW PROGRAMS OF MOSQUITO WORK IN NEW JERSEY. By Dr. William H. Martin, Director, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

THE MOSQUITO AND MOSQUITO BORNE DISEASE PROBLEM IN INTERNATIONAL AIR LINES OPERATION. By Dr. Frederick H. Shillito, Pan American Airways System, Boston, Mass.

Thursday, March 29 - Evening - No Session

Fifth Session

Friday, March 30 - 9:30 A.M. to 12:30 P.M.

SPECIES ASSOCIATIONS OF MOSQUITO LARVAE IN NEW JERSEY. By Dr. John B. Schmitt, Research Associate in Agriculture, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

THE UTILIZATION OF FISH BY A MOSQUITO CONTROL DISTRICT. THEIR EFFECTIVENESS AND LIMITATIONS. By Dr. Don M. Rees, Member of the Board of Trustees, Salt Lake City Mosquito Abatement District, Salt Lake City, Utah.

APPLICATION OF CULICIDE DUSTS BY EXPLOSIVES. By Dr. Robert D. Glasgow, Entomologist, New York State Museum, Albany, N. Y.

MOSQUITO WORK BY THE ARMY IN THE SECOND SERVICE COMMAND, WITH SPECIAL REFERENCE TO THE ENTOMOLOGICAL PHASES. By Col. C. M. Walson, Surgeon, and Lt. John V. Osmun, Entomologist, Second Service Command, Governors Island, New York, N. Y.

MALARIAL MOSQUITOES IN WAR AREAS IN THE NORTHEAST. By Herman L. Fellton, P. A. San. Engineer (R), U.S.P.H.S., New York, N. Y.

T. D. MULHERN

PRESIDENT OF VENEZUELA INSPECTS MALARIA CONTROL PROJECT. The following note and photograph are from Dr. Arturo Luis Berti, Chief Engineer, Division de Malariologia, Ministerio de Sanidad y Asistencia, Salubridad Publica, Maracay-Aragua, Venezuela.

"During a recent trip to the Eastern part of Venezuela, General Isaias Medina Angarita, President of Venezuela, made an inspection of the malaria control project going on in the City of Maturin. This project is in cooperation with the Venezuelan Government and the Institute of Inter-American Affairs."—Arturo Luis Berti, Chief Engineer.

General Isaias Medina Angarita, President of Venezuela, inspects malaria control project at Maturin.

LIST OF INSTRUCTORS AND STUDENTS, AND PHOTOGRAPHS FROM VENEZUELA'S RECENT COURSE IN MALARIA CONTROL

Instructors and students. Instructors seated.

Senor Arturo Luis Berti, Chief Engineer, Division de Malariologia, Ministerio de Sanidad y Assistencia Social, Salubridad Publica, Maracay-Aragua, Venezeluela, has sent us a list of the instructors and students, and some excellent photographs relating to the recent special course in Malaria Control for medical men and engineers, of which an account was published in MOSQUITO NEWS, Volume 4, Number 4 (December, 1944), page 132. Several of the photographs are reproduced below.

PROFESSORES

Dr. Arnoldo Gabaldon, Médico (venezolano) División de Malariologia, Maracay, Edo. Aragua, Venezuela.

Dr. Arturo Luis Berti, Ingeniero (venezolano) División de Malariologia, Maracy, Edo. Aragua, Venezuela.

Dr. Pablo Cova Garcia, Abogado y Entomologo (venezolano) División de Malariologia, Maracay, Edo. Aragua Venezuela.

View in the Labortory. Students at work.

Presenting certificates upon completion of the course.

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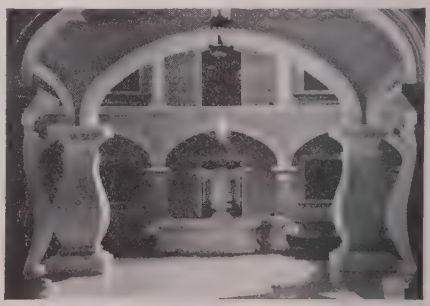
New buildings and laboratories at Maracay-Aragua.



Looking across the patio. Door to libra y above. To records below.

EDITORIAL SECTION

THE HOWARD-KRAUS SOCIETY

Readers of MOSQUITO NEWS will be interested in the following letter to our secretary.

Similar societies in local schools might become very effective allies of mosquito abatement commissions everywhere in maintaining popular interest in and support of their work.

Why could not the Howard-Kraus Society become the parent chapter of a national association of such local high school anti-mosquito and public health societies?

Such a movement, if started, should merit the support of all mosquito abatement commissions, of the American Mosquito Control Association, and of MOSQUITO NEWS.

If extended into Latin America as an international association of young people's anti-mosquito and public health societies, such a movement might contribute much to Inter-American understanding and co-operation in such matters.

"THE HOWARD-KRAUSS SOCIETY
of
South Side High School
Memphis, Tenn.

"March 28, 1945.

"MR. THOMAS D. MULHERN, *Secretary*
"American Mosquito Control Association
"Hotel Claridge,
"Atlantic City, New Jersey.

"My Dear Mr. Mulhern:

"We members of the Howard-Krauss Society would like to have a representative at the meeting of the American Mosquito Control Association; but since that is impossible we shall be looking forward to an account of the meeting in the New Jersey Association's 'Proceedings' as well as to the next issue of MOSQUITO NEWS.

"MOSQUITO NEWS is invaluable to our group, in that we use it for weekly program material as well as for source material in our annual insect-borne disease control essays. We wish you could visit the society now, just to see our pamphlet library, which has been filed and catalogued. We believe it is one of the finest school libraries on insect-borne disease control in the country.

"This month the society is presenting before the entire South Side student body and before two civil groups 'Rat Wise,' an original play on rat control, by a junior Howard-Krauss member. Mr. LePrince was out to see it last week and thinks it our best effort in dramatizing a story of citizen co-operation in an insect-borne disease control program.

"We members of the Howard-Krauss Society appreciate the significance of the American Mosquito Control Association. Not only are its practices felt in advancing economic and health conditions in our Mississippi Valley, but we realize that those same practices are serving to weld into closer relationship all the American republics.

"Sincerely,
(signed) "BETTY BARNETT,
Corresponding Secretary."

MOSQUITO LORE

With enormously increased popular interest and official, military and public activity in mosquito control and related work, mosquito control workers must, in the aggregate, have encountered a huge mass of resurrected mosquito lore; and now would be a good time to bring such material together.

Dr. Feemster's communication which follows is an interesting beginning. Perhaps other readers of MOSQUITO NEWS will follow suit.

"May 9, 1945.

"Editor, MOSQUITO NEWS.

"Dear Sir:

"To add to your collection of mosquito lore, I am sending to you an account of an incident which occurred at the State House here a short time ago.

"When the subject of mosquitoes came up in a group of state employees, a woman from another department offered to sing to us a little ditty which she remembered from childhood because her mother had sung it in an amateur musical comedy put on in her community.

"I cannot give you the musical score, but the words are as follows:

MOSQUITOES IN WINTER

Where do mosquitoes go, I'd like to know
In the winter time?

What do they wear for underwear
When they're under where?
I don't know.

Do the little hummerdingers
Sharpen up their stingers
In the winter time?

Where do mosquitoes go, I'd like to know
In the winter time?

"The idea seems to have been used with variations, as a worker in my office claims to have heard a similar ditty in regard to where flies go in the winter time.

"Very truly yours,
(signed) "ROY F. FEEMSTER,
"Director,
"Division of Communicable Diseases,
Massachusetts Department of Public Health."

REVIEWS AND ABSTRACTS

THE MOSQUITOES OF NEW JERSEY. By Thomas J. Headlee. Published by Rutgers University Press, New Brunswick, N. J., 1945. 326 pp., 86 figs., 16 plates and 14 tables. (Price $4.00.)

Dr. Headlee is to be congratulated on bringing together in easily readable form a full and extended account of the mosquitoes of New Jersey. The classic report of John B. Smith (1904) has long been out of print. Now Dr. Headlee has brought the work up to date with much new data and a full account of the extensive control activities carried on under his direction, especially the new and modern methods developed in handling problems associated with salt marsh mosquito breeding and control.

The opening chapter stresses the value of mosquito control and the last chapter presents in summary form the increased valuation of taxable lands due to mosquito reduction. In between are the following chapters:

2. Structure, classification and keys.
3. The New Jersey mosquito fauna.
4. Mosquito biology.
5. Influence of environment.
6. The history of mosquito control in New Jersey.
7. The principles and detailed procedure of mosquito control.
8. Larvicides.
9. Mosquito repellents.
10. Laws relating to mosquito control.

The above titles indicate rather fully the contents of the book. Chapter 2 gives a brief account of the structure of mosquitoes, both adult and larva. There are also presented rather unique keys for the identification of the adults and larvae. These keys should prove very valuable for field workers, as most of them can be used with nothing more than a hand lens. Chapter 3 is devoted to presenting in tabular form the results of trap collections of female mosquitoes for the ten-year period, 1932-1941. The chapter on mosquito biology is the most extensive of the book and is largely based on the work of John B. Smith, with added notes and some new data. Chapter 5 deals with the influence of environment and is restricted almost entirely to the conditions existing in New Jersey and no mention is made of the extensive work done in this field by other workers.

Though chapters 7 and 8 are very interesting, the reviewer had anticipated a fuller and more extended account of the many new developments in machinery and insecticides devised by the workers in New Jersey. The accounts are too brief and no reference is made to the plates that illustrate some of the machines at work.

The illustrations, except the plates (16), are nearly all from the report of John B. Smith. The plates are exceptionally fine. Unfortunately there is no index and only a very brief bibliography. The printing is well done but the paper is not the quality one could wish in such a work.

The reviewer could point to a few obvious errors, especially in the data given on distribution. The book should prove of great interest to all mosquito workers and is a valuable contribution. Dr. Headlee is to be congratulated on his long and faithful service to the state of New Jersey and in developing procedures of mosquito control that have been and always will be of great value to the state.

Robert Matheson.

METHODS OF PREVENTING THE TRANSFER OF DISEASE-CARRYING INSECTS ON AIRCRAFT. Monthly Bulletin of the Ministry of Health 3: 108-110, 1944. (England.) Report of the British West Indian Quarantine Conference Trinidad.

The conference discussed at length methods of preventing the transfer of disease-carrying insects on aircraft, a matter regarded as of much importance. The conclusions and recommendations of the conference are summarized as follows: Spray applications should be made to military planes along similar lines to civilian planes. Spraying aircraft on the ground before departure is most practical. If thoroughly carried out after the plane is loaded and immediately before departure, the residual spray will be sufficient to kill insects which might enter with passengers. A further spraying in the air may be advisable. Dispersion of the insecticide with Freon is preferable; next of choice is a power sprayer. The spray must be fine and all enclosed spaces must be thoroughly treated. Pyrethrum is the preferred insecticide. As a rule 8 cc. of standard pyrethrum extract (2 g. pyrethins/100 cc.) per M cu. ft. should be used, with not less than 5 minutes exposure. Regulations should be administered by the health authority of the airfield. At present it is impractical to set up an organization to carry out the work at every airport; therefore, responsibility should be placed on flight personnel, including entries in the journey log-book regarding disinsectization. Efforts should be made to keep airfields free from mosquitoes, also buildings in a zone of at least half a mile around airports. Classification of danger areas was considered so important as to be dealt with by an international body.—Fred C. Bishopp, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture.

DDT AS A MOSQUITO LARVICIDE. By J. A. W. Lever, Agri. Jour. Dept. Agri. Fiji. 15(3) pp., 79-80, Sept., 1944.

Notes are presented on a few small scale tests in Fiji. Two swampy areas infested with *Aedes vexans* larvae were sprayed, one with 5 per cent DDT in light diesel oil and the other with the oil alone. The kills were not complete and

slightly favored the oil alone. Larvae of *Aedes pseudoscutellaris* and *Culex fatigans* were introduced into two drums halved lengthwise. One was placed in the open and the other under a roof. They were sprayed with 2 cc. of a 5 per cent solution of DDT in a non-volatile mineral oil. A week later all in the exposed drum were alive and all in the sheltered one were dead. The 14.52 inches of rain which fell during the period overflowed the exposed drum, carrying away the larvicide. In a subsequent test no eggs were deposited for seven weeks in the drum which had been oiled, whereas in the drum treated with oil plus DDT none were found for 12 weeks. A 5 per cent oil solution of DDT was tried with success against *Culex fatigans* in an airraid shelter and in a pool infested with this species and *C. annulirostris*. DDT was also found effective as a dust (1 part DDT to 9 parts soapstone) on part of the latter breeding area. The author concludes that DDT is suitable as a larvicide under Fiji conditions where an annual rainfall of 120 inches occurs.—F. C. Bishopp.

SPRAY-KILLING OF MOSQUITOES IN HOUSES—A CONTRIBUTION TO MALARIA CONTROL ON THE GOLD COAST. By L. G. Eddey. Trans. Roy. Soc. Trop. Med. and Hyg. 38 pp. 167-188 with discussion pp. 188-197. November 29, 1944.

The war made necessary a serious consideration of malaria control in the native port village of Takoradi, where suddenly in 1941 large numbers of Europeans began to arrive. To supplement more prompt control operations a test was carried out with a number of spray formulas applied to the interiors of the houses. *Anopheles gambiae* constituted the principal local vector of malaria. *A. funestus*, an effective carrier, was recorded occasionally and a few other species were met with rarely. Dissections indicated a malaria rate among *A. gambiae* of 3 per cent. The treatments used consisted of pyrethrum dust at the rate of 0.35-2 oz. per thousand cubic feet, pyrethrum-kerosene, cresol-kerosene, and pyrethrum-aerosol. Pyrethrum-aerosol proved to be the insecticide of choice, with pyrethrum-kerosene next best in order of labor economy. Each of these methods, however, appeared to be satisfactory from the standpoint of mosquito kill. There appeared to be a marked lowering of malaria morbidity rates especially among the Europeans, although the precise effect of the spraying operations could not be differentiated from the results of the general malaria control efforts.—F. C. Bishopp.

OBSERVATIONS ON *Anopheles gambiae* AND OTHER MOSQUITOES AT WADI HALFA. By D. J. Lewis. Trans. Roy. Soc. Trop. Med. & Hyg. Vol. 38, No. 3, pp. 215-229, Dec., 1944.

Observations are recorded on *Anopheles gambiae* and other mosquitoes at Wadi Halfa, Sudan, especially from the standpoint of the zoogeographic position of the area. Much importance is attached to maintaining a barrier between the Sudan, where this dangerous malaria carrier occurs normally, and Egypt where the species has appeared recently and from which it may be eliminated. The author presents an interesting account of the Wadi Halfa area of the Nile and of the climate and other conditions as influencing mosquito distribution and breeding.

Eight of the 22 species recorded for Egypt and the Sudan are present in Wadi Halfa—3 *Anopheles*, 3 *Culex*, an *Aedes* and a *Theobaldia*. *A. gambiae* is by far the most important species and paris green, oiling, grading and filling are employed in its control. Paris green, 1 per cent in Nile silt, is distributed by hand. In the Farar basin and canal *Gambusia holdbrooki* is a useful control agent. The other two *Anopheles—multicolor* and *pharvensis*—were controled by the measures employed and the other species except *C. pipiens* are unimportant as pests of man.—Fred C. Bishopp.

DR. F. C. BISHOPP DELIVERS HERMAN M. BIGGS MEMORIAL LECTURE. At the invitation of the New York Academy of Medicine, Dr. Fred C. Bishop, Assistant Chief in Charge of Research, U. S. Bureau of Entomology and Plant Quarantine, delivered the Herman M. Biggs Memorial Lecture before a distinguished group of medical men and others in the Academy Auditorium (New York City) on April 5, 1945. The title of Dr. Bishopp's lecture was "The Medical and Public Health Importance of the Insecticide DDT." This was the twelfth annual Biggs lecture and the first delivered by a scientist not of the medical profession.

H. H. Stage.

FORMULATION OF *DDT* SPRAYS AND DUSTS.[1] By R. D. Chisholm, U. S. Department of Agriculture, Agriculture Research Administration, Bureau of Entomology and Plant Quarantine.

A survey was made of the methods used by many Federal and State investigators in the formulation of DDT sprays and dusts. Attention was called to the patented status of DDT, and to the need for the consideration of the legal phases before formulation suggestions are used commercially. The form of DDT used for general agricultural purposes is known as "technical DDT" and is specified to have a setting point not lower than 88° C. Mixtures of DDT and a diluent, such as talc or pyrophyllite, containing up to 50 per cent of DDT may be ground, provided that care is exercises to avoid overheating the mill. More concentrated mixtures do not have desirable physical properties. Ground mixtures are difficult to wet and require vigorous agitation or a wetting agent to maintain uniform suspension in the spray tank. The use of a minimum of wetting agent was suggested to avoid excessive run off. Various other methods of formulation were suggested, such as

[1]Read at the join meetings of the American Association of Economic Entomologists and the Entomological Society of America at New York City, December 13-15, 1944.

suspensions resulting from the addition of solutions of DDT in water-miscible solvents to water, solutions for direct application, emulsion of solutions of DDT in various water-insoluble solvents, and dusts. Attention was called to the possible catalytic decomposition which may result from the presence of iron and iron oxides and other anhydrous metallic chlorides. Most of the common insecticides with the exception of pure nicotine do not cause decomposition. Most of the solvents inhibit the catalytic decomposition reaction. Some biological tests have indicated that some insecticides or fungicides, such as lime-sulfur or bordeaux mixture, have reduced the period of effectiveness of DDT sprays. Whether this reduction is of chemical or physical nature has not been established. A loss of DDT from deposits on glass plates exposed in direct sunlight was observed. The value of standardized mixtures for experimental purposes was suggested.

Author's Abstract.

Some Practical Suggestions for the Rearing of *Aedes aegypti* (Linn.). By Helen Louise Trembley. Proceedings of the Thirty-first Annual Meeting of the New Jersey Mosquito Extermination Association, pp. 168-172.

The author describes the technique employed by her for rearing *Aedes aegypti,* of which about 1,200 adult females are required each week for work at the laboratories of the Division of Physiology, National Institute of Health, U. S. Public Health Service, Bethesda, Maryland.

She tells how, in year round maintenance of adequate colonies of the insect, the egg are produced in quantities; how they are "conditioned" and manipulated to assure a maximum hatch; how the larvae, pupae, and adults are cared for; and how the adults are manipulated, both in experimental and therapeutic use, and in the production of eggs for continuation of the stock colonies of mosquitoes.

R. D. G.

The Breeding of the Salt-Marsh Mosquito in Midwestern States. By Hermann L. Fellton, Journal of Economic Entomology, vol. 37, pp. 245-247.

This article reports the salt-marsh mosquito *Aedes sollicitans* to have been occasionally troublesome as a result of breeding in the outflow from salt springs, salt wells, oil wells, and from coal mines, at many places in Indiana, Illinois, Missouri, Arkansas, Oklahoma, New Mexico, Arizona and other States. Notes on *Aedes cantator, A. dorsalis* and *A. taenorhynchus* are included.

R. D. G.

Anopheles quadrimaculatus in Northeastern United States. By Ralph C. Barnes and Herman L. Fellton. Proceedings of the thirty-first Annual Meeting of the New Jersey Mosquito Extermination Commission, 1944, pp. 48-51.

This important vector of malaria " . . . is now reported from all of the Northeastern States except Vermont, and its occurrence in that State seems most probable." This paper then gives detailed records of recent inspections in the neighborhood of war establishments.

R. D. G.

The Plan of Operation for the Northeastern Division of the Malaria Control in War Areas Office of the U. S. Public Health Service. By Herman L. Fellton and Ralph C. Barnes. Proceedings of the Thirty-first Annual Meeting of the New Jersey Mosquito Association, pp. 45-47.

Malaria is continuously present (is endemic) in many of our southern states. While formerly prevalent in many parts of the northern United States, it has almost completely vanished from that section in recent years. In consequence, the malaria control work performed by the Public Health Service, with headquarters at Atlanta, Georgia, had been very largely restricted to 20 southern states where it is complimentary to the control work performed by the Army and Navy within the boundaries of military reservations.

Army, Navy, Coast Guard and Merchant Marine personnel returning from malarious areas overseas; the introduction of prisoners of war; and the widespread transfer of personnel between malarious and non-malarious areas presents a special hazard for our non-malarious regions where, nevertheless, malaria carrying mosquitoes may be rather generally present and sometimes locally abundant.

Prompted by this hazard of possible local epidemics in non-endemic areas, the Surgeons General of the Army and of Public Health decided that steps should be taken to guard against it. Surgeon General Thomas Parran has described the situation in the following words: "Inevitably malaria cases will be dispersed through the United States by returning troops. Local outbreaks are probable in parts of the country like the Upper Mississippi or the Hudson Valley, which have malaria mosquitoes, but which have been free from infection for many years. However, it is believed that history will repeat itself and that such outbreaks will die out, because, as in the past, the environment is not favorable to perpetuating the infection. But we should accelerate nature's process with mobile control forces to deal with outbreaks in any area."

The paper then directs attention to local outbreaks of malaria which have occurred in non-endemic areas, such as those at Camden, New Jersey, in northern Ohio, in eastern Iowa, and in southern Minnesota; Terre Haute, Indiana, had several hundred cases in 1938. One small town in Illinois had 53 cases in 1943.

At first, the Malaria Control in War Areas program was limited to work within a one-mile zone around military and essential industrial establishments within the endemic area, and was designed to guard against the transmission of malaria from infected civilians to military and essential industrial personnel.

More recently this has been extended to certain non-endemic areas for the purpose of pre-

venting malaria transmission from infected military personnel to non-infected military personnel and to the civilian population. Here, also, control work is still restricted to the one-mile zone surrounding military establishments where the malaria carrying *Anopheles quadrimaculatus* is prevalent, and where there is a concentration of human malaria carriers.

The work is carried on by mobile malaria control units, consisting of a passenger automobile or station wagon and a 1½-ton truck to carry equipment, materials and supplies for entomological survey and inspections; for the application of larvicide; for minor draining and related work; and for spray-killing of adult mosquitoes.

In addition to their routine duties, these units will also be readily avialable for the control of malaria outbreaks which may occur in the northeastern states.

R. D. G.

MALARIA SURVEY OF THE DEAD SEA AREA DURING 1942, INCLUDING THE DESCRIPTION OF A MOSQUITO FLIGHT TEST AND ITS RESULTS. By J. M. Shapiro, Z. Saliternik, and S. Belferman. 1944. Roy. Soc. Trop. Med. and Hyg., Trans. 38(2): 95-116, 8 ref., illus.

A study was conducted in several residential sections at the northern end of the Dead Sea to determine the source of anopheline mosquitoes that had been prevalent in that area during the last few years. The four species of *Anophels* present in the Dead Sea are *A. elutus,* the chief carrier of malaria in Palestine; *A. superpictus* and *A. sergenti,* other important vectors; and *A. multicolor,* the malaria-carrying ability of which is not yet definitely known.

In the spring of 1942 adults of *A. multicolor, A. sergenti,* and *A. superpictus* were found in the Kallia area, but it was not known whether breeding occurred here or in the Feshka swamps 6 to 9 kilometers distant. In the entire Kallia area no wadies or swampy areas of recent origin were discovered, but larvae of *A. multicolor* were found breeding in the subsurface of the gravel along the shore line, where it appears that puddles with a salt content of 2½ per cent are created by the rising of the water level at night. Adults of *A. multicolor* evidently lay eggs in the puddles which disappear after sunrise. Larvae then filter through the spaces in the gravel and develop underneath the surface where sufficient moisture exists. After the surface was oiled and covered with soil, a marked reduction in the number of *A. multicolor* in this area was noted within a short time.

Since new breeding places of *A. superpictus* and *A. sergenti* outside the Kallia area had been controlled, any mosquitoes coming into this area from June on originated elsewhere. It was observed that the decline in the numbers of *A. sergenti* in Kallia in July and August corresponded to the lessened activity of this species in the Feshka swamp, and in the autumn, the most active time for *A. sergenti,* adults were found both in Kallia and in Feshka. Although numerous adults, filled with fresh blood, were found in caves at Feshka during the winter months, only one or two were found at this time in Kallia. The importance of caves as a resting place and collecting area for adult mosquitoes was not realized in Palestine before this study was made. Eggs, larvae, and pupae of *A. sergenti* were found at Feshka in the swamp. It was thought that during January and February the mosquitoes obtained blood from the cattle and camels that were transferred by the natives from the villages to the swamp area, where the temperatures were higher and green grass was available for food. The presence of hosts in the swamp as well as rains and cold weather in the Kallia area seems to prevent mosquitoes from coming into this area during the winter.

In order to test the flight range of mosquitoes, about 10,000 adults were released in the Feshka swamp during November and December. The mosquitoes that were released had been sprayed with "gold dust" (a finely powdered bronze preparation). Only one "gold-stained" mosquito, a female *A. sergenti,* was found among among the 3,024 males and females recovered. This female was captured in Kallia about 4.2 kilometers from the point of release. Since a number of adults hav been found to carry pollen on their thorax, it is believed that spraying the mosquitoes with colored pollen might be used to mark them instead of "gold dust."

The authors believe that the Feshka swamp is the source of *A. sergenti* in the vicinity of Kallia, and that this species can fly 6 to 8 kilometers, at least in the Dead Sea area.—Helen Sollers, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture, Washington, D. C.

THE UTILIZATION OF FISH BY A MOSQUITO ABATEMENT DISTRICT; THEIR EFFECTIVENESS AND LIMITATIONS. By Don M. Rees, Ph.D. Author's abstract of a paper read at the 32nd Annual Meeting of the New Jersey Mosquito Extermination Association, at Atlantic City, N. J., March 28, 29, 30, 1945.

There is no unanimity of opinion on this subject, which is to be expected, as control problems differ in different areas. However, every possible agency should be used in mosquito control work, and as fish constitute one of the effective agencies of control in certain districts, their use might profiitably be adopted by other districts. Through proper care *Gambusia* can be introduced into more northern states by gradual acclimatization. The most important limiting factor determining the winter survival of *Gambusia* in the more northern states is; that the water in which they live does not freeze over completely for a period longer than a few days at a time. *Gambusia* are probably more effective as a mosquito control measure if introduced into an area than they are in their native habitat. *Gambusia* in Salt Lake City are very effective in controlling pest mosquitoes in small ornamental pools and a satisfactory ratio in such pools is about three fish to every square yard of surface area. In Utah, to date, *Gambusia* have

not been found suitable for control purposes in larger bodies of water.

LABORATORY EVALUATION OF CHEMICALS FOR RENDERING FABRIC REPELLENT TO MOSQUITOES. By Philip Granett and Harry L. Haynes. Author's abstract of a paper read at the 32nd Annual Meeting of the New Jersey Mosquito Extermination Association, at Atlantic City, N. J., March 28, 29, 30, 1945.

As part of the program of mosquito repellent research and development instituted by the Office of the Surgeon General in 1942 for the armed forces, the Office of the Quartermaster General, War Department, suggested in the latter part of 1943 that an exploratory search be made for substances which would render fabrics repellent to insects. A considerable part of this study was undertaken for the Office of the Quartermaster General in 1944 by Rutgers University.

The need for such a study was based on the repeated observation in the field that even though exposed skin surfaces may be protected for several hours by a good repellent, mosquitoes may bite through clothing and thus cause annoyance and may transmit disease.

A laboratory method of evaluating chemicals for rendering fabric repellent to mosquitoes was developed. This consists essentially of impregnating a measured quantity of the substance under test on standardized cotton fabric "sleeves." At periodic intervals the treated sleeves are fastened about an individual's arm and exposed to the attack of caged mosquitoes. Observations are made when alighting and/or biting occurs.

Using this method it was apparent that repellents can be found which impart long lasting repellency to cloth.

Although preliminary laboratory results are promising, it is realized that much more laboratory and particularly field results are needed to develop the most practical substance and method for fabric impregnation.

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